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## INTERIM TECHNICAL STANDARDS AND GUIDELINES FOR ELECTRONIC FILING IN THE UNITED STATES COURTS

**Office of Information Technology**
**Administrative Office of the United States Courts**

Effective December 1, 1996, the Federal Rules of Procedure (Fed. R. App. P. 25, Fed. R. Civ. P. 5, and Fed. R. Bankr. P. 5005) were amended, permitting courts to establish local rules to allow documents to be filed, signed, or verified by electronic means, provided such means are consistent with technical standards, if any, established by the Judicial Conference.

Proposed technical standards for electronic filing were presented to the Committee on Automation and Technology for information at its December 1996 meeting. Shortly thereafter, the draft standards were mailed for review and comment to about 3,000 addressees, including all federal judges, court unit executives, and automation support managers, as well as many bar associations, lawyers, state judges, and other federal and state officials. The draft proposal was also published on the judiciary's Internet web site (www.uscourts.gov), as well as the judiciary's intranet (J-Net).

Substantive formal comments were received from more than 60 individuals and organizations, and a substantial amount of informal open discussion took place among interested parties via the Internet. Some comments were accommodated by clarifications to the language in the proposed standards; others required changes to the standards themselves, some major and many minor. As many as possible of the suggestions received have been incorporated into revised proposed technical standards.

At its June 1997 meeting, the Committee on Automation and Technology was presented with the revised proposed standards. Recognizing that these standards may need to be updated in response to related developmental efforts currently under way within the Electronic Case Files (ECF) Initiative, the Committee approved the revised proposed standards as interim technical standards, but chose not to recommend Judicial Conference approval at this time. It is anticipated that the issue will be raised again at the June 1998 meeting, by which time the direction of the Electronic Case Files Initiative should be more definite, and the technical standards can be further revised as necessary.[1] In the meantime, the approved interim technical standards, attached, will be published as an IRM Bulletin, and courts choosing to implement electronic filing are urged to use these interim standards as guidance to their efforts.

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[1]As an example of one expected area of revision, the use of Extensible Markup Language (XML) is being considered as an alternative to Electronic Data Interchange (EDI) for the inclusion of transaction data within an electronic filing submission. XML, which was recently approved by the World Wide Web Consortium (W3C) as a W3C Recommendation, did not exist when these technical standards were first being devised, but XML has already found widespread adoption within the Internet community. For further details on XML, which is a subset of ISO standard SGML, see http://www.w3.org/TR/REC-xml.

# INTERIM TECHNICAL STANDARDS AND GUIDELINES FOR ELECTRONIC FILING IN THE UNITED STATES COURTS

## Introduction

Effective December 1, 1996, the Federal Rules of Procedure (Fed. R. App. P. 25, Fed. R. Civ. P. 5, and Fed. R. Bankr. P. 5005) were amended to permit electronic filing in appellate, district, and bankruptcy courts under certain circumstances. The amendments permit federal courts to establish local rules to allow documents to be filed, signed, or verified by electronic means, provided such means are consistent with technical standards, if any, established by the Judicial Conference of the United States. The Committee Note on amended Civil Rule 5(e) indicates that national technical standards for electronic filing "can provide *nationwide uniformity*, enabling ready use of electronic filing without pausing to adjust for otherwise inevitable variations among local rules. ... Perhaps more important, standards must be established to assure *proper maintenance and integrity of the record* and to provide *appropriate access and retrieval mechanisms*" [emphasis added].

This document contains interim technical standards and guidelines for electronic filing. Comments and suggestions regarding these interim standards were sought from the judiciary and potential filers, and many of the suggestions received have been incorporated into the current revision.

## Defining Technical Standards

Since 1988, the federal judiciary has been experimenting on a limited basis with electronic filing, and much has been learned regarding the feasibility and usability of a variety of electronic filing technologies and processes. While much progress has been made in the course of this experimentation, the technologies necessary to support electronic filing continue to evolve as the public and private sectors move to adopt and promote the use of electronic commerce. Similarly, a variety of procedural and operational issues which require further exploration have been identified. As a result, any technical standards specified for electronic filing should be adopted with an expectation that technological change is inevitable and that the standards will necessarily have to evolve to reflect improvements in computer systems, software, telecommunications, and business processes and policies.

To accommodate the evolving nature of the technologies currently available to support electronic filing, the approach taken here is two-fold. Both technical *standards* and technical *guidelines* are provided:

- The technical *standards* are intended as mandatory requirements which courts choosing to permit electronic filing must implement in order to comply with the amended rules. The standards are phrased as functional requirements that any electronic filing system must meet; there may be a variety of technical implementations by which any given functional standard

may be met. The technical standards contained herein focus primarily on ensuring the "proper maintenance and integrity of the record" and providing "appropriate access and retrieval," so as to result in a capability for filing which is at least as good as existing paper systems.

- The technical *guidelines*, on the other hand, are not intended to be mandatory requirements, but rather recommendations for experimental use subject to further evaluation. The guidelines may become candidates for future standards, if they are proven fully capable of meeting judiciary requirements. The technical guidelines contained herein focus on promoting "nationwide uniformity" of electronic filing across the courts. Additional technical guidelines may be proposed in the course of testing and evaluating alternative approaches to electronic filing.

A Background Discussion appendix contains an overview of the electronic filing process and a description of the various technology alternatives that should be considered in supporting that filing process. The background discussion is intended to provide a context within which decisions about the choice of electronic filing technical standards may be discussed.

**Definition of Terms and Assumptions**

Document. The technical standards and guidelines below are intended to apply to electronically filed documents that become a part of the court record and thus are included within the case file. These standards are not intended to apply to trial evidence, trial exhibits, or discovery materials that are not part of the permanent official court record of the case. There may be benefits (primarily to the litigants) in having these additional materials available in electronic form, but evidence often does not originate from the litigating attorneys and is not readily available in electronic form. Presently, the courts have less need to set technical standards for evidence because it will not be captured and stored in court computer systems.

Link. The related terms "link" and "hyperlink" are used in many different ways. The standards and guidelines make distinctions between at least four different kinds of links: (1) hyperlinks that point to external information sources (e.g., World Wide Web sites) are referenced in Guideline G4, with significant concerns for the long-term stability of such links; (2) hyperlinks referencing text within the same document do not create such long-term stability concerns and might include an active table of contents or "bookmarks" which facilitate cross references to different sections of a document; (3) database links identify relationships between records (or documents) within the database, such as linking an answer in a case to the complaint to which it is responding; and, (4) a link appearing as an icon or specially marked text on a user interface screen is a navigational aid that might take a user, via a simple mouse click on the link, from the midst of doing a docket entry to a view of a related document. All these different kinds of links have their value. Each kind of link can be supported with many different kinds of implementations that serve to make IT useful to users in different contexts. It is important to make certain that the terms are used in a context that makes clear what kind of link is being referred to. For example, Guideline G4 recommends against the use of hyperlinks to external information sources (type 1, above), while

other kinds of links are permitted and will be supported.

Sealed Documents. These technical standards do not address the handling of sealed or classified documents. Current practice is that neither information about such documents nor the documents themselves are placed on court computer systems.

Mandatory Electronic Filing. We assume that electronic filing will not become mandatory any time soon, if ever. While this is probably true at the national level for the federal judiciary, it is possible that at some point individual courts or judges might strongly encourage litigants to file electronically, especially in certain kinds of cases.

Common Acronyms:

NIST is the National Institute of Standards and Technology, a federal agency.

NARA is the National Archives and Records Administration, a federal agency.

PDF is Portable Document Format, a widely accepted final-form document exchange standard.

EDI is Electronic Data Interchange, an industry-standard data format for electronic commerce.

## The Transition to Electronic Filing

Electronic filing is a major new initiative which will require new software and new telecommunications capabilities in the federal courts. There are currently several different approaches being tested through experimental electronic filing systems, using both judiciary-developed systems and systems developed commercially by information systems vendors, and additional approaches are being considered. The technical standards and guidelines presented herein assume that new capabilities will have to be acquired, not that these capabilities necessarily exist today. This effort will take some time to evolve and to define the best choices by balancing costs, benefits, and improvements in service. These standards will necessarily have to evolve to accommodate changes in technology and changes in the judiciary's business processes.

The Judicial Conference Advisory Committees on Rules has acknowledged the importance of technical standards in its notes for the amendments to the rules. It should be mentioned, however, that the adoption of standards can have both positive and negative consequences. For example, one of the areas of consideration in defining technical standards is the trade-off between courts and filers regarding the level of effort required by each in conforming to any given standard. The committee notes suggest that providing a uniform view of the courts for filers is important; however, achievement of this goal may entail more work for the courts. Moreover, it appears that the technology required to implement a uniform public filing interface is not yet fully proven, and the associated procedural issues are not fully understood. Such considerations are important in determining equitable and useful technical standards, and they indicate the need for flexibility in an evolving environment.

Some courts have already begun experimenting with electronic filing using approaches which pre-date these interim standards. Courts that accept electronic filings prior to the establishment by the Judicial Conference of national technical standards will be permitted a *two-year transition period* to come into compliance with the established national standards.

Pending adoption by the Judicial Conference, the interim technical standards contained herein are offered as guidance to those courts that may choose to implement electronic filing in advance of action by the Conference. The Administrative Office of the U.S. Courts, Office of Information Technology, is also available, upon request, to offer technical advice to courts considering the use of electronic filing.

## Interim Technical Standards for Electronic Filing

Document and File Format Standards

**S1.** All documents filed electronically must be capable of being printed as paper, or transferred to archival media, without loss of content or material alteration of appearance.

*Commentary*

Printed documents will continue to be used regularly in the conduct of court business, so it must be possible to provide an accurate printed reproduction of any electronic document. Furthermore, for purposes of archiving, it may be necessary to convert electronic documents to paper (or to microfilm, or to magnetic tape for sound and video). Therefore, it is important to be able to preserve and reproduce faithfully both the content and the appearance of electronically submitted documents.

To ensure the ability to create a faithful reproduction of the original, care must be taken to preserve document appearance (formatting) during the electronic submission process. The critical elements of formatting which must be preserved are line breaks and page breaks. It is also critical that when the document is printed that the font displays the same character (glyph) when printed and viewed, although a font that approximates the original font may be substituted when the original font is not available.

Documents containing color may be submitted if the local court rules or orders permit it. It may not be possible to maintain color fidelity precisely in the display and printing processes. These documents may require special handling to ensure that they are printed in color. See also Guideline G6 below.

**S2.** Electronic documents must be submitted in a court-designated electronic file format, and retained in the electronic format in which they are submitted.

*Commentary*

It is important to be able to preserve and reproduce faithfully both the content and the appearance of electronically submitted documents. Post-submission conversion of

electronic documents to different electronic formats (i.e., from one word processing internal format to another, or to an "interchange format") should be avoided since such a conversion can change the content and appearance of the electronic document. Even changing printers for a word processing document can change its appearance. A recommended document format guideline for electronic submissions is the Portable Document Format (see Guideline G1); documents filed in PDF format will retain their content and appearance without requiring conversion.

**S3.** Every implementation of electronic filing must accommodate the submission of non-electronic documents. Physical documents submitted to the court in paper form may be imaged to facilitate the creation of a single electronic case file.

*Commentary*

While direct electronic submission is the preferred way to capture documents in electronic form, courts will still need to accommodate paper submissions as a component of a comprehensive electronic case files system. To facilitate the creation of a single electronic case file, it will be necessary to convert paper submissions to electronic form. A paper document can generally be imaged in a way that avoids loss of content or appearance. The following technical standards are recommended: ITU Group 4 (formerly CCITT Group 4) is the compression method of choice for documents containing largely text and simple graphics; JPEG is the compression method best suited to photographs. Both of these image compression methods can be supported on many commercial software packages with the addition of a TIFF file header. Both Group 4 and JPEG are also supported by PDF (see Guideline G1). A scanning resolution of at least 300 dpi (dots per inch) is recommended.

To make imaged documents text-searchable, the images may be converted to text via optical character recognition, or OCR. It should be noted, however, that OCR conversion of an imaged document to text will often introduce significant errors in the converted text. The OCR process may be acceptable as a means of creating searchable text for court use, but not for creating official records for public access or for retaining archival records. The image (or the paper original) corresponding to OCR-created text must be retained for archival purposes.

While creation of a single electronic case file is encouraged, imaging of non-electronic submissions is not required. Courts may choose to maintain (some or all) paper submissions separately from electronic submissions.

<u>Document and System Security Standards</u>

**S4.** A mechanism must be provided to ensure the authenticity and integrity of the electronically filed document. This requires the ability to verify the identity of the filer, as well as the ability to verify that a document has not been altered since it was filed.

*Commentary*

The simplest approach for ensuring the ability to verify the identity of the filer and to verify the integrity of a document is to store electronic filings in a restricted-access file system (e.g., NetWare or Unix) that requires both a login and a password. These systems will record file creation and modification (if any) times. For implementations permitting submissions via electronic mail, it should be noted that an e-mail address can be forged, so additional mechanisms, such as a PIN password, are required to authenticate the identity of the filer. A more comprehensive solution would be to base the electronic filing system on a digital signature technology (such as public/private key encryption), which can be used both to authenticate filer identity and to ensure the integrity of a document's content. Note, however, that the use of a digital signature technology may make the archiving process significantly more complex (see Guideline G9). There is also an open issue about how to satisfy the statutory requirement for an original signature, such as that for debtors on some bankruptcy documents (see also Background Discussion section II.D.)

**S5.** If a court implements an interactive electronic filing process, the court must control interactive access to the electronic filing system via a user authentication process. When an electronic communication channel is used, the login process must be secured via use of a telephone connection directly to the court, a secure communications channel, or other secure means.

**S6.** Files capable of carrying viruses into court computers (especially on floppy disks and in electronic mail) must be scanned for viruses prior to processing.

**S7.** Access to computers used for electronic filing must be isolated from access to other court networks and applications.

*Commentary*

The public must not be permitted access to internal court networks or computers upon which court operations are performed. One way to isolate Internet web sites that may be used for electronic filing is to use an Internet firewall. Additional network security methods can be combined with a firewall to further enhance network security. Similar security precautions should be taken for other electronic filing implementations.

**S8.** Electronic filing systems must protect electronic filings against system and security failures. In addition, they must provide normal backup and disaster recovery mechanisms.

*Commentary*

Several methods are available to protect against loss of electronic filings during periods of system availability: (1) electronic filings can be written to isolated media (e.g., magnetic tape) frequently during the day; (2) electronic filings can be copied to another computer system frequently during the day; or (3) a continuous register of information can be printed identifying the submission and submitter of each filing. The latter method would allow a

court to request re-submission by the filer in the event of a system failure. Note that, for courts wishing to maximize the availability of electronic filing services, the period of system availability (i.e., the "work day") may be nearly 24 hours.

Administrative procedures that will allow for alternative filing sites (e.g., an emergency standby system or a neighboring court) in the event of temporary system unavailability can also be supported.

Electronic Filing Process Standards

**S9.** All electronic document submissions must generate a positive acknowledgment to the filer indicating that the document has been received by the court. The positive acknowledgment must include the identity of the receiving court, date and time of the document's receipt (which is the court's official receipt date/time), and a court-assigned document reference number (i.e., docket transaction number).

*Commentary*

In addition to providing a document receipt to the filer (which merely acknowledges the receipt of the submitted document), the court may also wish to provide a document validation (e.g., document checksum) by which the filer may be assured that the submitted document was received correctly by the court. Provision of a document validation is optional, but is recommended if digital signature methods are being used, since document validation is a common feature of digital signature technologies. The court needs to identify the document hashing algorithms it will support.

**S10.** Electronic filing systems must provide mechanisms for quality assurance and quality control of the submitted documents and case management data by both the court and the filer.

*Commentary*

The court is responsible for ensuring the accuracy of its case management data. How a court chooses to ensure accuracy is a local court management decision. Electronic filing systems should enable the court to review submissions and validate the accuracy of the case management data before accepting and docketing an electronic filing.

A filer may need to indicate that a particular document was submitted in error (usually by marking, but not deleting, the incorrect docket entry), and offer an additional (new) filing to rectify the error.

**S11.** Adequate public access to electronically filed documents must be provided.

*Commentary*

The case files and dockets of the federal courts are public records. Regardless of the electronic filing process that is adopted, adequate public access must be provided to the records so filed. Electronic public access outside the courthouse is recommended using methods such as PACER systems. If a court chooses to image its paper submissions and

combine them with electronically filed documents to form a single electronic case file, then the public should have electronic access to all documents in the electronic case file, whether or not they were originally submitted in electronic form. This standard is not intended, however, to require extensive conversion of non-electronic filings if the court chooses not to maintain a single electronic case file for all its filings.

## Interim Technical Guidelines for Electronic Filing

Document and File Format Guidelines

**G1.** The preferred document format for electronic filings is text submitted as a Portable Document Format (PDF) file (except see Guideline G2 below). Electronic exhibits and images not available in text form should be embedded within the PDF document.

*Commentary*

The Portable Document Format (PDF) is a widely accepted final-form document exchange standard. It provides a rich environment for representation of formatted text documents, including pictorial information, such as images. PDF files can also carry audio and video information. The PDF standard is specified in "The Portable Document Format Reference Manual" by Adobe Systems, Inc., Addison-Wesley Publishing Co., 1993, ISBN 0-201-62628-4. More recent extensions to the technical specification are published electronically via the Internet at www.adobe.com. An inter-agency group within the federal government has recommended that the National Institute of Standards and Technology (NIST) develop a Federal Information Processing Standard (FIPS) based on the published PDF specification. Efforts are also under way to develop national (American National Standards Institute, ANSI) and international (International Standards Organization, ISO) standards for PDF based on this published specification. A variety of companies and universities have created PDF products. A federal government PDF user group is exploring with the National Archives the possibility of accepting PDF-formatted electronic documents as an archival standard. Acceptance of PDF as an archival standard will require long-term stability of the basic PDF specification.

Guidelines are necessary to advise filers on the best methods for creating PDF documents which will be acceptable for electronic court submissions, since not all document features (e.g., special fonts) capable of being preserved within PDF will necessarily be supported by all electronic filing systems. The Administrative Office of the U.S. Courts will provide recommendations on how to create the most useful PDF documents, using only formatting features that will be commonly available in all electronic filing systems.

**G2.** The preferred document format for the batch electronic submission of bankruptcy petitions, schedules, and claims is the Electronic Data Interchange (EDI) format defined in standard transaction 176 (Court Submission). EDI transactions should comply with approved American National Standard X.12 EDI, and with appropriate Implementation Conventions maintained by the Administrative Office of the U.S. Courts.

**[ NOTE: This section is under review and likely to change. The recent emergence of Extensible Markup Language (XML) offers a potentially superior alternative to EDI for the exchange of data within documents. For more information about XML, see http://www.w3.org/TR/REC-xml. ]**

*Commentary*

The use of industry-standard electronic data interchange (EDI) formats for data exchange are particularly well suited for automated processing of batch (non-interactive) submissions, as may be filed by computer-to-computer interaction from large creditors filing many bankruptcy claims or sole practitioners filing a bankruptcy petition generated via commercial bankruptcy forms software. Substantial work has been done in creating EDI electronic commerce standards for the specific high-volume bankruptcy transactions noted above. Other common court transactions may also be candidates for future use of EDI standards.

**G3.** Electronic document submissions should carry sufficient case management data to enable the automation of the court's docketing process. The structured description of court events as defined in the EDI standard transaction 176 (Court Submission) offers a well-defined reference model for how docket event data might be transmitted, particularly with a batch submission.

**[ NOTE: This section is under review and likely to change. The recent emergence of Extensible Markup Language (XML) offers a potentially superior alternative to EDI for the exchange of data within documents. For more information about XML, see http://www.w3.org/TR/REC-xml. ]**

*Commentary*

To provide maximum benefit to the court's document submission process, electronic submissions should carry sufficient case management data to permit the automatic docketing of the filing. If the courts adopt a common, well-defined standard for the submission of case management data, filers will also benefit, since such standards will facilitate the development of value-added products for law offices by commercial software vendors. The EDI reference model contained in standard transaction 176 (Court Submission) could serve as the basis for a common format for the submission of case management data. It contains a syntax of "event-action-qualifier", and a constrained vocabulary for each of these three objects. For example, a particular motion might be categorized as "Pleading - Filed - Motion for Extension of Time". The "words" in this constrained vocabulary are defined for specific applications in draft EDI Implementation Conventions maintained by the Administrative Office of the U.S. Courts.

**G4.** Hyperlinks embedded within an electronic document should refer only to another part of the same document. Hyperlink references to external documents or information should not be used.

*Commentary*

The basic concern here is to preserve the long-term integrity of the record. To preserve the integrity of a document's content, the integrity of any external information referenced by hyperlinks must also be ensured. Information sources referred to outside the filed document may change significantly (or even disappear) between the time the document is created, and the time it is reviewed by the court, or archived as a permanent record, or retrieved for historical review some long time later. For example, many Internet web sites change daily, and the long-term stability or availability of document references to such web pages cannot be guaranteed. When the external information changes or disappears prior to review, the intended message of the filer may be invalidated, and the integrity of the record is not preserved. The problem is particularly acute when the missing or altered reference information is material to the argument being presented.

Some information sources may be relatively stable and their use via hyperlinks deserves continuing exploration. One example of a stable external information source is a database of court opinions, which grows by accumulating new records, but without changing the content of historical records. Use of such citation hyperlinks would require that the court's electronic case files application include a computer-assisted legal research (CALR) component which can read and interpret the citation link, and then take appropriate action to retrieve and display the cited material. There are currently very few other external data sources which offer the same promise of long-term stability of content. Concerns over how to determine what information sources might offer suitable long-term stability have prompted the overall recommendation that hyperlinks to external information sources should be avoided.

**G5.** The use of document images (including facsimile) as the document format for electronic submission is strongly discouraged. Every effort should be made to have original documents submitted in a standard electronic format which retains document content and appearance in a compact, text-searchable form.

*Commentary*

The preferred format for submission of most electronic filings is text submitted as a PDF file (see Guideline G1). Accepting scanned images as a primary means of creating an electronic case file has several drawbacks that make such an approach less suitable for this purpose. Images typically require 20 times the storage space of the equivalent text document, which in turn substantially increases the costs for document submission, creation and maintenance of the document database, and database backup and recovery. Because of the large file sizes, images are more difficult for court staff and the public to access from remote sites over dial-up telephone lines. Perhaps most significantly, images are not text searchable, and the conversion to text using optical character recognition (OCR) software

introduces significant errors, which may preclude accurate retrieval based on text search.

While the use of document images as the document format for electronic submission is discouraged, imaging is nonetheless a necessary component of a comprehensive approach to electronic filing. As noted in Standard S3 above, document imaging is useful to facilitate the creation of a single electronic case file by imaging those documents which are submitted to the court in paper form.

**G6.** Courts should designate what document features they are willing to accept in electronic format, and what features they are not willing to accept. They should also consider the use of a document feature list that shows which acceptable features require special handling, so that filers can indicate when these special-handling features are present in an electronically filed document.

*Commentary*

There are potentially many different kinds of practical limitations that a particular court might choose to impose on electronic filings. None of these limitations is necessarily inherent in the standards and guidelines. For example, a court might choose to define local requirements for document page size, or font types and sizes. Printing very large pages (e.g., 17 x 30 inches) might be difficult for a particular court to accommodate, although PDF can easily support files with this characteristic. Likewise, a court may choose not to accept any document with a font size of less than 2 pts. Similarly, PDF is capable of supporting multi-media presentations with sound and video, but a court might choose not to accept electronic filings containing these types of information.

The very broad potential of electronic filings suggests that it might be useful to establish a checklist of features permitted to be used in a particular filing. Such a checklist might include such document features such as color, video, sound, and common page formats. This features checklist could serve as an document description (metadata) that would make it easier to submit, preserve, retrieve, and disseminate the associated electronic document, by making it apparent at the outset what kind of special handling might be required for a particular submission. Alternatively, such a checklist might be used only when a filing required special handling, as when making use of features beyond a common default format (8.5 x 11, no color, no video, etc.).

**G7.** The ability to archive court documents in a rich electronic final-form format is necessary in order to maximize the long-term benefits of electronic filing.

*Commentary*

The National Archives and Records Administration (NARA) currently accepts paper documents, images as microfiche or microfilm, and ASCII text on magnetic tape. NARA is currently considering how to archive electronic documents in other formats (such as Portable Document Format, described in Guideline G1 above). See section III.D in the Background Discussion section for further discussion on archival requirements.

The Administrative Office and many other government agencies have indicated to NARA that archiving electronic documents in a final-form format is an important requirement. The Administrative Office will continue to work with NARA and other federal agencies to find a common solution for this common requirement.

Communications Guidelines

**G8.** An electronic filing system should offer several means by which electronic documents can be delivered to the court. Commonly available electronic delivery mechanisms include network connections, direct electronic connection with the court, and physical delivery of media.

*Commentary*

Courts are encouraged to support as many avenues of access for electronic filing as are reasonable. Examples of network connection delivery vehicles include the Internet for interactive filing, and the use of electronic mail or commercial Value-Added Networks for batch filings. Direct electronic connections might include dial-up telephone modem connections, or a high-speed telephone link to a high-volume filing site. Examples of physical delivery of media might include floppy disks and magnetic tapes. Most of the methods given here are already used in some courts.

Note that attachments to electronic mail submissions need to be encoded in 7-bit ASCII in order to be successfully transported through some e-mail gateways. Support for "MIME base 64" encoding and "uuencoding" of e-mail attachments is recommended.

Document and System Security Guidelines

**G9.** Digital signature standards based on public-private key encryption technology may be used both to authenticate filer identity and to ensure the integrity of a document's content.

*Commentary*

Several competing methods for digital signature are currently being evaluated, but there is as yet no universally accepted standard, nor a clear market-leading product or approach. Furthermore, while digital signature technologies offer excellent mechanisms for authenticating filer identity and validating document integrity, the use of a digital signature technology may make the archiving process significantly more complex. To ensure the long-term ability to read and validate a document, it will be necessary not only to archive the document itself, but also to archive the public key and information about the mechanism for applying and reading the digital signature (or to otherwise ensure the long-term availability of the digital signature mechanism). These issues will, no doubt, be resolved by the marketplace over time, but the answer is not yet evident.

Private key security methods may be useful in some applications where a high level of security is required. Electronic signatures based on such biometric data as fingerprints and voiceprints may also be useful in some circumstances.

Electronic Filing Process Guidelines

**G10.** Electronic filing systems should support both an interactive filing process and the capability to receive a complete filing submitted using a (non-interactive) batch process.

*Commentary*

See section I.C in the Background Discussion section for an overview of interactive and batch electronic filing processes.

**G11.** The court should provide a capability for *pro se* filers to file electronically.

*Commentary*

To reduce the burden on the court in creating and maintaining a fully electronic case file, it may be useful to make it easier to get electronic documents from all case participants. This might mean, for example, providing a computer at the courthouse with appropriate software to accommodate filers who lack the requisite computer equipment or telecommunications. It is an open issue whether the burden of supporting *pro se* filers will outweigh the cost of scanning paper filings. This issue will require further evaluation in experimental settings.

Private sector services for converting source documents into an appropriate electronic format may be another means to enable additional filers to participate in electronic filing.

## Appendix: Background Discussion

This appendix contains an overview of the electronic filing process and a description of the various technological and procedural considerations that affect the selection of solutions to support that filing process. It is intended to provide a context for discussions about the choice of electronic filing technical standards.

### I. Introduction

A. Scope of Electronic Filing Technical Standards

For the purposes of these technical standards and guidelines, electronic filing is defined as including the submission of case file documents and the submission of related docketing information.

1. Submission of case file documents. Electronic filing is the process by which information required by the court is delivered by electronic means rather than in the conventional paper form. Typically this includes any documents which normally become part of the case file, whether submitted by the court or the litigants.

2. Submission of docketing information. One of the important benefits which courts may be able to realize through electronic filings is minimizing the data entry associated with filings. Achieving this benefit requires that the document filed in electronic form be accompanied by case management information in an electronic format that is easily interpreted by court computers. Several alternative approaches that may be used to accomplish this goal are described below in section I.C.

3. Exclusions. For purposes of these technical standards and guidelines, electronic filing does not include noticing from the court or between counsel. The technical standards assume that the federal rule amendments intended to facilitate electronic filing do not govern the noticing process. Rather, for example, Fed. R. Bankr. P. 9036 governs electronic bankruptcy noticing, and it specifically permits electronic notices to replace printed and mailed notices. However, provision for electronic noticing as a substitute for mailed notices between counsel, or in other kinds of cases, has not yet been explicitly permitted.

   Electronic filing, as the term is used here, also does not include the process of disseminating orders from the court. Some courts have begun the process of experimenting with methods for electronic dissemination of orders, but this process is not governed by the amended rules intended to facilitate electronic filing.

   Should it become necessary or desirable to define technical standards for electronic dissemination of notices and court orders, techniques similar to those recommended here will likely be applicable, although further study is still needed. There are currently experiments

under way using facsimile to send copies of orders, and using Electronic Data Interchange (EDI) for bankruptcy noticing, which may include some kinds of orders. The inclusion of structured data in electronic notices or orders (such as through the use of EDI) offers the ability to use such transmissions to provide case management data in computer-processable form to law offices. This may facilitate automation of law office business processes.

B. Benefits of Electronic Filing

Courts, the bar, and the public potentially can achieve many benefits from electronic filing. One of the underlying assumptions is that most of the documents in the case file were originally created in electronic form by either the law office or the court. Following are some of the long-term advantages which motivate the replacement of paper case files with electronic case files:

1. Filer Savings. Filers benefit by reducing the costs of printing, copying, mailing, and courier service associated with filing paper documents. They also benefit from the various forms of enhanced access described below.

2. Space Savings. The storage space required to file documents could be substantially reduced by using electronic case files. To store one million pages of paper documents takes about 500 linear feet of shelf storage, or about 50 four-drawer file cabinets. Those million pages can be stored as electronic images in about 50 gigabytes, or the space of about a half a file drawer using magnetic disk technology (using six commercially available nine-gigabyte hard disks), and the commonly used CCITT Group 4 image compression format. Furthermore, if all documents were submitted in electronic text form instead of image form, the same million pages would require only 2.5 gigabytes, using less than half the space of a shoe box. Of course, not all documents submitted to a court consist of text alone; some contain pictures or drawings. Therefore, some combination of text and images will be required to support the need for pictures and diagrams as evidence and attachments to submissions.

3. Staff Time Savings. Paper handling accounts for a significant portion of the staff time spent processing documents, typically much more than data entry time. This paper handling includes opening mail, removing staples, sorting documents by case number, punching holes, fetching paper case files, inserting documents in the case file, and returning the files to the shelf. In addition, significant resources are required serving front counter and chambers case file requests that require retrieving, sometimes copying, and returning case files to and from shelf storage. The most costly staff effort, consuming hours of time, occurs when a document or case file is misfiled, or misplaced. The considerable staff effort involved in handling paper documents can be largely avoided when documents are submitted electronically.

   Data entry costs may also be reduced. Electronically submitted documents can include all the information necessary for docketing, thereby permitting the possibility of automating much of the docketing process, except for the final quality assurance step necessary to ensure the accuracy of submitted information. Well-defined standards for case management and document management data can describe how to present the case number, case type, court

type, and court identification within the document. The document can include a court event description which specifies the kind of motion being filed or hearing requested. Other kinds of information which might be carried as data with the document include the names and roles of parties in the case, and references to related cases, both in the same court and in other courts. Related financial information (such as monetary claims) might also be described in detail in a data format (and transferred easily to a spreadsheet).

4. Enhanced Access. Electronically stored case files can provide simultaneous access to many users, as compared to the current situation of a single paper case file assigned sequentially on a first-come, first-served basis. Problems of missing files or documents can be reduced substantially, although perhaps not completely eliminated. Text-search tools allow access by content, so it becomes easy to revisit that one memorable phrase in a large document. Public access can also be enhanced. If the documents are mostly image and not text, remote access becomes more difficult or expensive because of the large file sizes, but it is possible using enhanced, high-speed communications services.

   Citations to statutes or opinions can be carried as data within an "intelligent" document. If computer-aided legal research tools capable of interpreting legal citations embedded within an electronic document are integrated into electronic case files systems, readers could "click" on a citation embedded in a document and have the statute or case appear beside the original text. However, note that (by design) legal citations are a particularly stable document reference link; references to other external information sources may not be as stable (e.g., the referenced source may be later altered or even disappear) and such linkages should be avoided unless the long-term integrity of the referenced information can be ensured.

5. Enhanced Security and Integrity. Security for electronic documents can be substantially better than the current paper system. Several active authentication methods are available to ensure the identification of the filer, including login and password, and digital document signatures which mate the identity of a document and its content with its filer using encryption techniques. Electronic records can easily be duplicated for off-site storage, improved disaster recovery, and greater records security.

6. Document Management. A document management system (DMS) can track all data accesses and modifications. A DMS can keep prior versions of records and maintain an audit trail of the changes and who made them. It can roll back changes to show what the data looked like before it was changed. Audit trail and roll-back capability, combined with appropriate controls for data access and physical access to equipment, can provide a much higher level of security and integrity than what can be provided currently for paper case files.

C. An Overview of the Electronic Filing Process

Figure 1 on the following page illustrates the process of electronic filing. It shows the basic steps of creating a document, adding case management data, filing it electronically, and receiving an electronic acknowledgment.

The process of electronic filing begins with the creation of the document, typically in the law office, or offices of the U.S. Attorney or U.S. Trustee. Currently, the content of most documents is largely text that is produced using commercial word processing software. Some documents are produced using commercial forms software that displays a facsimile of an official form on a computer screen into which the filer enters the required information.

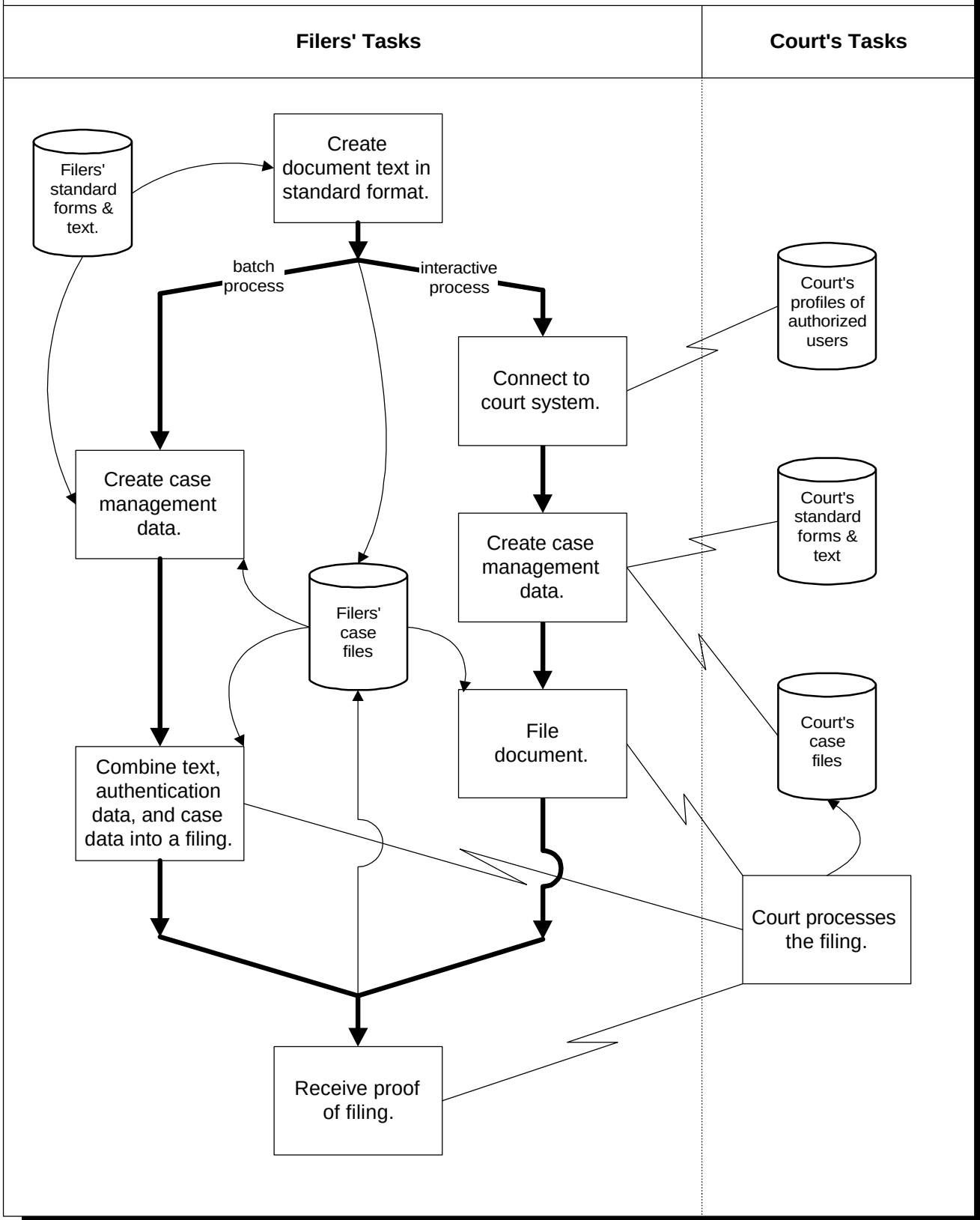
The next step in the electronic filing process is the conversion of the document from its local proprietary format into a standard electronic format accepted by the court. Standard formats are necessary because it is not possible for the court to support all the potential proprietary products which are in use, and because of the need for long-term retention of electronic records. It is important that the filer retain control over the appearance and content of the actual electronic document submitted to the court. The technical standards and guidelines were written with the intent of minimizing the impact of this process on both the documents, and the resources of the attorneys and courts. However, a certain minimum level of technical capability is required by all participants in this process.

There are two generic approaches to the process of electronic filing, *interactive* processing and *batch* processing. These two approaches differ primarily in how the case management data which accompanies the submission is prepared, and in how the receiving computer applications in the court operate. The "interactive" process involves live interaction between the filer and the court's computer system. The "batch" process assumes that the filer has all the necessary information (in a law office database, or on existing paper documents) to complete the filing without interaction with the court's computer.

The interactive process requires that the filer contact the court computer either directly through a court dial-up modem, via a private network, or via a public network (e.g., Internet). The filer proves his identity through a login and password process. The court computer prompts the filer to fill out forms on the screen. The filer selects appropriate items from predefined lists, and might enter a small amount of text. The document the attorney created on the local law office computer is then transmitted to the court in a standard format.

The batch process requires that the attorney use a computer program that runs locally on the law office computer. The program creates the case management data in a standard format which the court will accept. There are some documents (e.g., common bankruptcy forms such as petitions, schedules, and claims) which require little or no case management information outside the context provided by the document itself. Most documents, such as motions, require a modest amount of added case management data (e.g., case number, document type, and party names and

**Figure 1. Electronic Filing Process Between Filers And A Court (Showing Batch and Interactive Filing Options)**



roles) in order to maximize the benefits of electronic filing. Precise descriptions for formatting this kind of data are necessary if the computer programs necessary both to generate it and to receive it are to be built, whether by commercial software providers, by the technology staff of law firms, or by the courts. The documents submitted must also contain information which authenticates the filer. The complete document can then be delivered to the court on a floppy disk, by electronic mail, or by other electronic means.

Assuming the document complies with the standards and is readable, the court might choose to review the filing for accuracy (e.g., to check whether the document content matches the case number and docket event described for it). The filing is then docketed to the court's case management computer. In response, the court computer generates an acknowledgment of receipt of the filing. The acknowledgment should show the date and docket number of the filing, and be returned to the filer as proof that the court received the submission. The manner in which acknowledgments are returned depends on the process used to submit the document.

## II. The Filer's Perspective

Attorneys who participate in electronic filing will need to change the process they use to deliver documents to the court, but not the process they use to create documents in their office. The technology which underlies the electronic filing process should be easy to use for an attorney. Those who develop software for attorneys, or manage the process of submitting documents, will be most affected by the technical standards adopted.

### A. Generating Documents

The process of creating text documents should be largely unaffected. Documents submitted to courts are typically produced in electronic form using word processing software. Bankruptcy forms can be created on a personal computer using one of many products designed to automate this process. Sometimes document management systems or databases are used to generate filings. None of these processes should change significantly from a filer's perspective.

The methods used to submit attachments, either as exhibits or evidence, may have to change. Often these attachments are not original documents created in the law office. Typically, a photocopy of the attachment document accompanies the paper filing. With electronic filing, the attachments will have to be converted to electronic form, by the use of a document scanner or other means.

### B. Formats for Documents

There are three broad categories of information for which formats are required in order to support electronic filings: text, pictorial information, and structured data. Text is simply words on a page, with minimal structure. More complex text documents require enhanced capabilities such as page layout and formatting requirements (e.g., margins, footnotes at the bottom of a page), fonts (`Courier`, Times Roman, etc.), and type styles (**bold**, *italics*, etc.). Pictorial information includes scanned images of an original document, graphical representations of data, drawings, charts, and photographs. Structured data is the content of a database field or data used by

computer programs. Some examples of structured data include names, addresses, dates and numbers, and the contents of forms where each box may correspond to a particular database field and the responses are constrained to a well-defined type of data. Compound documents may contain any or all of these kinds of information. An examples of a compound document is a pleading which includes the text of a motion, an imaged document as an exhibit, and case management data in structured form. The technical guidelines for electronic filing support the following kinds of compound, multi-media documents:

1. ASCII. ASCII text is suitable for simple documents only, where the filer is unconcerned about the appearance of the document. Depending on the choice of font style and size, line breaks and page breaks may not appear where the filer expects them to. Footnotes cannot be placed at the bottom of a particular page with confidence. Exhibits which contain graphics or images cannot be supported at all.

2. Portable Document Format. The Portable Document Format (PDF) is a widely accepted document exchange standard which provides a rich environment for representation of formatted text documents, including pictorial information, such as images. PDF files can also carry audio and video (Quicktime format) information. It is easy to create a PDF representation of *any* file which can be printed under Microsoft Windows or Macintosh operating systems, by printing to a file through a PDF printer driver instead of printing to a physical printer. It is also possible to create PDF files on DOS and UNIX systems by converting PostScript output into a PDF file. PDF files can be viewed on any of these platforms (without loss of content or appearance), and free viewing programs are available.

3. Electronic Data Interchange. Electronic Data Interchange (EDI) standards are well suited to carrying structured data, such as bankruptcy forms and notices, case disposition information, and criminal history data. In the bankruptcy area, several companies that produce automated forms packages for debtor attorneys have already produced experimental software which creates bankruptcy petitions in EDI format, and several courts are experimenting with software to automate the opening of a bankruptcy case based on these EDI petitions. In these experiments, the petitions are delivered to the court on floppy diskettes along with a signed paper copy of the form.

   An EDI transaction can also be used like an envelope, where the EDI transaction consists of the case management data in structured form, and it carries within it a PDF file of an arbitrarily complex document. This may be useful when a batch process is appropriate, to combine a text or compound document with associated case management data.

   The EDI standards contain a framework for a structured description of court (docket) events. This offers a precisely defined standard "notation" for docket events that has the power and flexibility of a natural language description, but offers information management capabilities which derive from a simple syntax and a constrained vocabulary. Structured docket events have the potential of becoming a powerful tool for business process reengineering in both courts and law firms, since new information-based tools can be developed to automate business processes and work flow management based on the well-defined content of the docket events. Achieving these benefits depends on maintaining a *compatible structure and*

*vocabulary* for electronic docket information, whether it is collected through an interactive terminal session or is submitted as an EDI transaction or an electronic mail file transfer. The process of providing this data can be made simple for filers by providing familiar presentation tools, such as forms data entry screens and menu-driven data entry choices.

**[ NOTE: The above section is under review and likely to change. The recent emergence of Extensible Markup Language (XML) offers a potentially superior alternative to EDI for the exchange of data within documents. For more information about XML, see http://www.w3.org/TR/REC-xml. ]**

C. Submitting Documents

Two generic processes are envisioned for electronic filing: an *interactive* and a *batch* approach. From a filer's perspective, the user interfaces may not differ between these approaches as much as the sequence of steps involved. The interactive approach requires that the filer establish a communications link with the court in order to enter case management data on the court's computer. The current electronic filing experiments in the Northern District of Ohio and the Southern District of New York (Bankruptcy) using the Internet and PDF provide examples of how this process might be implemented. World-wide web technology can provide easy access to the court using standard web browser software (e.g., Netscape or Mosaic) and any telecommunications provider that offers Internet access. The filer logs in, and is prompted to enter case number(s), parties represented, and parties the document is filed against. Then the PDF document is selected and uploaded to the court. This process makes use of standard commercial software in the law office, and court-designed forms for the capture of case management data. When the document is received, the court creates an acknowledgment which appears on the filer's screen and may be saved and/or printed to serve as a proof of filing.

The batch approach, on the other hand, requires the filer to enter the case management data prior to establishing a communications link with the court's computer. One of the important benefits of this approach is similar to the benefits the court receives from electronic filings, which is that it can provide new opportunities to automate law office business process. The user interface might look similar to that developed by courts and other commercial electronic filing products currently being tested. However, some kinds of data which are typically found on the court's computer, like a list of parties to file against, may also be needed on the law office computer. Electronic noticing capabilities, either from the court or counsel, might be one method to provide the necessary data. This model of exchanging data in both directions (both to and from the court) is similar to the widely implemented model of electronic commerce in industry. After the filer creates the case management data, the filing is assembled into a single submission containing data and document, and transmitted to the court. The complete filing can be transmitted using any of several different mechanisms, such as electronic mail through private or public networks, or via delivery of physical media, such as a diskette. When electronic mail is used for delivery, the acknowledgment can be returned to the submitting address. It is not clear what the best method is to deliver an acknowledgment when physical media are delivered to the court, but a printed acknowledgment might be mailed to the sender.

D. Filing Security

Login and password are the most common authentication methods in use in government and commercial activity today, and are well suited to an interactive process. Courts can easily assign a login and password for attorneys, since they have a formal relationship with the court. However, this approach addresses neither the requirements for security in a batch process nor the need for signatures by parties such as litigants and debtors in bankruptcy, who do not have formal relationships with the court and who may be prosecuted for fraud. There are both technical and procedural solutions which can be effective in addressing these latter issues.

Facsimile signatures offer one possible solution. One way to carry a facsimile signature is with a scanned image of a signature accompanying a text document. Another way is to capture a combination of an image, and a recording of the forces and motion of an actual signature and transmit it with an electronic filing. The latter method uses signature capture pads such as those used by United Parcel Service drivers. Facsimile signatures can provide an interim solution for authentication of individuals unknown to the court, such as debtors in bankruptcy, and for batch filings submitted via either e-mail or delivery of media. A procedural alternative to facsimile signatures is that the attorney or non-attorney petition preparer must retain an original signature for the signing parties of all electronic filings. A Personal Identification Number (PIN) might be used as a simple authentication procedure for batch submissions from attorneys.

Current digital signature technology provides the possibility for significant enhancement of document security over paper systems currently in use, password protected systems, and the simple authentication methods described above. There are several methods currently used to implement digital signature services. They differ in detail, but are conceptually similar in their use of encryption technology and the public-private key approach for document authentication. Two examples are the Fortezza suite developed by the National Security Agency which uses the Skipjack algorithm and Clipper chip, and the approach recommended by the American Bar Association which relies on the RSA encryption algorithm and commercially available software. In another proposal, the U.S. Postal Service might act as a key management service, and authenticate and time stamp each transaction.

It is premature to define mandatory digital signature standards at this time. This technology is changing rapidly, and most government agencies have not yet defined policies for its use. Also, there is no clear market-leading product or approach. There are also many practical issues related to archiving, key management, and the role of trusted third-parties which pose significant technical challenges.

Users of electronic filing may be more concerned about document integrity than strong technical methods for authentication. There is a clear requirement to ensure that documents are not altered. Verifying document integrity is a two-step process. When the document is created, a "hash" is calculated using a mathematical process that produces a single large number which is different for each document. Techniques for creating a hash are widely available and inexpensive. This process of creating the hash produces a different result if even minor alterations to the document are made. The hash value accompanies the document during all phases of document management. The recipient can recalculate the hash for the document *using the same method*,

and if the values match, the document has not been altered. Although it is not essential, greater security is provided if the hash is encrypted in a manner that the filer's public key can decrypt. This establishes both document integrity and authenticity with one piece of data. It ensures that the filer is the one who created the hash and not someone attempting to alter or substitute the document.

Documents and case management data can also be encrypted to preserve confidentiality. This is usually not an issue in most court case files, since most documents are a matter of public record. However, in an interactive terminal session, it may be useful to encrypt a communications link to keep passwords private. This method is used in securing connections to the Internet electronic filing experiments in the Northern District of Ohio and the Southern District of New York (Bankruptcy).

## III. The Court's Perspective

### A. Formats Accepted

Document format issues have been the subject of extensive analysis, discussion, and experimentation in the process of exploring solutions for electronic filing. It is simply not possible for courts to support all proprietary word processing formats that are in use today. Conversions between word processing formats can often create significant differences in document appearance, and sometimes in content. Court documents have a long retention requirement. New software may not be able to read old file formats. There are trade-offs between the need to use commercial products, and the need to choose widely accepted and easy-to-use standards.

ASCII text provides a lowest common denominator for document exchange. ASCII text can capture the basic text content of a document, but it lacks many of the capabilities which attorneys and judges have come to require for document formatting and appearance. It also cannot carry attachments that include images or drawings.

PDF provides a *de facto* standard (and may soon become an International Standards Organization approved standard) for preserving both the content and the appearance of complex documents across different kinds of computer platforms. The PDF specification was published in book form and has been implemented by a number of vendors. It supports both searchable text and images. Free viewing software is available on the Internet for several different platforms.

EDI standards offer a well-defined way to carry structured data. This is particularly important in the forms-intensive bankruptcy process. EDI is widely used in government and industry, especially by large institutions such as taxing authorities, banks, and utility companies, which are major creditors in bankruptcy. EDI also provides a clear way to specify how to carry case management data in a standard way which can be applied to other kinds of documents. Further, EDI can be combined with PDF to bring data and documents together in a single file. EDI has broad potential application in other areas as well, including criminal and civil case opening, case disposition reporting, and noticing. There are a large number of companies that offer tools which facilitate the use of EDI. These range from turnkey products in specific application areas, to generic forms front-ends, and powerful data mapping systems which move data from EDI

standard formats into local databases, and vice versa.

**[ NOTE: The above section is under review and likely to change. The recent emergence of Extensible Markup Language (XML) offers a potentially superior alternative to EDI for the exchange of data within documents. For more information about XML, see http://www.w3.org/TR/REC-xml. ]**

B. Electronic Public Interface

The success of electronic filing depends on providing access in ways that make it easy for attorneys to participate. Courts should provide the same kinds of electronic access that businesses do, and tools are readily available in the commercial marketplace to support the user community. There are two distinct technology issues in defining the public interface: *telecommunications method* and *user interface*.

Telecommunications methods are categorized by how they relate to the overall electronic filing process. Interactive sessions might be initiated via several different possible communications methods: the public Internet, private networks, or by directly dialing the court's computer through telephone lines and modems. Batch submissions might also be initiated through similar communications methods.

Electronic mail can be sent using either public (Internet) or private networks. Commercial Value-Added Network (VAN) services are the most commonly used method to transport EDI messages; they provide highly reliable service, a detailed audit trail, and acknowledgments which are critical to providing an electronic equivalent of the current paper process for noticing. Physical media, such as diskettes and magnetic tapes containing submissions in electronic form, can also be delivered to the court.

Most of the telecommunications methods require an infrastructure for supporting electronic filing which is not currently in place in the courts. For example, most courts do not have Internet access to provide web sites to the public or to receive electronic mail through the Internet. Many courts currently may not have sufficient telephone lines and modems available to support electronic filing through direct access.

The court must not only provide the telecommunications connectivity, but it also must provide (build or buy) the user interface for systems that use the interactive approach to accept filings. Once the user is connected, the court presents a series of forms which are used to gather required data prior to accepting the document. One way forms can be presented is using Internet web technology. This requires building Internet web sites and forms templates for each individual court. The completed electronic forms are then linked interactively to a court database. It is also possible to present forms and data to the user in a manner that does not require web browsing software in the law office, such as by interactive menus as used in the PACER systems.

Courts also must build or buy applications that will receive batch filings. Experimental software is currently being tested in several courts for automatically opening new bankruptcy cases based on receiving EDI format petitions on floppy diskettes.

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C. Court Systems Security

Information security technology is needed to guarantee document integrity and to protect court computer systems from unauthorized access. The use of public key encryption techniques for ensuring document authenticity and integrity were discussed above with the filer's perspective. In many situations, requiring technology-intensive solutions for ensuring document authenticity may not be as important an issue as document integrity. The courts, together with the Administrative Office of the U.S. Courts, need to define the requirements and priority for this technology. Further experimentation is needed, and market forces need to shape commercial practice and products, prior to selecting mandatory technology standards for security.

There is another step in protecting electronic filings which is also important. This is to make sure that soon after documents are filed they are stored on long-term media isolated from the receiving computer system so that they are protected against systems failures or penetrations of security, and so that they are easily recoverable in the event of system failure. One way this might be accomplished is by logging filings to tape. Another important consideration is that electronic filings should be scanned for computer viruses, especially those submitted by a batch process on floppy disks. Other kinds of electronic filings may have similar security risks associated with them.

The protection of court computer systems is clearly a priority requirement. Currently, courts which establish Internet connections are required to use commercial Internet firewall software to prevent access to court networks and computers. Better methods for isolating Internet connections may become available as commercial tools evolve. The use of login and password restricts access to court computers and limits privileges.

D. Long-Term Retention of Electronic Records

Long-term retention of electronic records, and ensuring permanent access to them, is important. Currently, the courts depend on the National Archives and Records Administration (NARA) to store and preserve the judiciary's permanent paper records. However, NARA does not currently accept records in any electronic format other than ASCII text.

The lack of support for archiving more complex electronic formats is a common problem faced by many government agencies that are beginning to rely on electronic records. Technical Guideline G1 recommends the use of PDF format for electronic filings. The Department of Defense has already established a policy that many documents requiring permanent retention will be stored in PDF format, and other government agencies are exploring this possibility. Several agencies have approached NARA about archiving electronic documents in PDF format, and it is expected that NARA will seriously consider this possibility, in addition to other formats.

If NARA decides not to accept PDF files for archiving, there are several alternatives. The courts could seek an exception from NARA to support PDF submissions. Or NARA might request that the courts consider maintaining electronic records themselves, without relying on Federal Record Centers. This approach may be more reasonable for electronic records than it would be for paper, but it still creates a new burden on the courts. Alternatively, the courts could choose to convert their records to some other electronic format that NARA decides to accept. Or courts could "print" their records to paper, microfiche, or microfilm to put them into a NARA-acceptable format.

The courts should also consider the possibility that new technology will provide better methods for interchange of electronic documents at some point in the future. A long-term plan for records management needs to provide for the possibility of migration of electronic formats.

Records management policy also requires that if courts use digital signatures, they must archive them. In order to interpret these digital signatures in the future, there may be a need to preserve the system used to create the digital signature: that is, the method used for encryption of the signature, the method used to calculate the hash, and the public key associated with the person making the digital signature. Without this kind of information, the digital signature becomes useless in all future attempts to verify the document. However, instead of doing its own key management, the court may rely instead on a trusted third-party certificate authority to provide the information used to verify digital signatures. Of course, this alternative has its own set of technical and policy issues. From the perspective of preserving the long-term integrity of court records, these certificate authorities must preserve their records on a permanent basis. This requirement is not yet widely recognized. The patchwork of state regulations related to digital signatures generally creates very few requirements on who may establish a certificate authority, and what such an organization must provide. The courts may want to limit which certificate authorities they will support to those that will guarantee long-term records retention. Some further regulation of certificate authorities may be necessary to ensure the viability of digital signature technology for use in document archiving.

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